

MARSHALL STAR

Serving the Marshall Space Flight Center Community

Nov. 6, 2003



NASA/Renee Bouchard

'No achievement without risk'

Former Apollo flight controller Gene Kranz, left, joins NASA Administrator Sean O'Keefe, right, during a "NASA Update" broadcast on NASA TV last week. O'Keefe discussed new safety initiatives and how the new NASA Safety and Engineering Center fits into the Agency's Return to Flight efforts. Kranz, who coined the term "Failure is not an Option" during the successful rescue of the Apollo 13 crew in 1970, told NASA team members during the broadcast that they must be responsible for what they do. Kranz said "discipline," "competence," "confidence," "toughness" and "responsibility" are part of working for NASA. "You must play the role destiny has written for you. There is no achievement without risk," Kranz said.

Safety & Mission Success Week set Nov. 17-21 at Marshall

Center team members asked to read CAIB report, make recommendations

by Dave Spacek

In its final report, the Columbia Accident Investigation Board (CAIB) identified many issues having broad, Agency-wide implications, including concerns that specifically targeted the NASA "culture."

Due to the far-reaching scope of the report, it is extremely important for all NASA civil service and on-site contractors to read the report and understand its applicability to their specific work environment. To further this objective, the Agency has designated Nov. 17-21 as "Safety & Mission Success Week."

Every Marshall team member will receive a copy of the CAIB report, as well as the recommendations from the CAIB Agency-Wide Action Team.

See *Safety* on page 13

Skylab 30th Anniversary Special: See inside The Star

STS-107 crew will shine permanently on Space Mirror

NASA Headquarters release

In a sentimental formal ceremony saluting their dedication and sacrifice, the seven crew members of STS-107 were permanently memorialized Oct. 28 at the Astronauts Memorial Foundation's Space Mirror Memorial at Kennedy Space Center in Florida.

The names of Rick Husband, Willie McCool, Laurel Clark, Michael Anderson, David Brown, Kalpana Chawla, and Ilan Ramon have been etched into the wall of mirror-finished black granite, joining the names of 17 other heroes who gave their lives for the U.S. space

program.

The families of the fallen Columbia seven were joined at the invitation-only event by senior NASA staff, dignitaries representing Israel and India, and various legislators.

Dr. Jon Clark, widower of Laurel Clark, spoke on behalf of the crew members' families.

"We truly are all Columbia family because we've all shared the loss of the crew and the precious first spacecraft that carried the name Columbia," Clark said. "It would be hard to capture the thoughts and

See *STS-107* on page 13

NASA adapts miniature biological lab for use in space

NASA Headquarters, Ames Research Center release

NASA is adapting tiny laboratories embedded in compact discs (CDs) to conduct biological tests aboard the International Space Station and to eventually look for life on other planets.

The CDs, with imbedded biological tests, are under evaluation by NASA scientists, and several academic and industrial partners. The miniature laboratories were adapted to detect life forms

See *Lab* on page 12

Once upon a time, in a place called 'Skylab' ...

Editor's note: The following stories in this Skylab 30th anniversary series were written and researched by Marshall Center Historian Mike Wright and Bob

Jaques, an employee of ASRI and a Marshall historian. Fred Deaton and Marshall Imaging Services provided the photographs.

America's first space station

Skylab was the first American space program wholly dedicated to scientific research, and the Marshall Center played an important role in this unprecedented scientific venture.

Skylab's three, three-man crews spent up to 84 days in Earth orbit and performed more than 100 experiments. The Marshall Center developed the major Skylab components and the four Saturn launch vehicles used to launch the station and its three separate crews. Marshall was also responsible for directing many of the experiments.

Marshall engineers designed the centerpiece component for Skylab, the orbital workshop, by converting a Saturn rocket stage into a habitable space module containing living quarters and support systems as well as experiment areas. Marshall assignments also included the Skylab airlock module, docking adapter, and Apollo Telescope Mount — the first manned astronomical observatory designed for solar research from Earth orbit.

The Center was also responsible for investigations in materials processing and solar physics, and designed and built a series of Skylab biomedical experiments. Marshall also served as the NASA interface for a series of Skylab experiments proposed by students from across the country.

In 1973, NASA launched Skylab into space using a Saturn V rocket. Unfortunately, a huge panel protecting the orbital workshop from micrometeoroids and solar radiation ripped off seconds after the launch.

NASA had originally planned to launch its first three-man

crew to Skylab on May 15 using a Saturn IB rocket. Faced with the crisis of how to fix the station so that it would be habitable, NASA put the crew launch on hold. It was May 25 when Skylab's first crew went into space and conducted repairs to the station. They returned home on June 22.

A second crew was launched on July 28 and splashed down on Sept. 25. Repair procedures were part of both missions, but attention also focused on the scientific data that Skylab gathered.

The second mission orbited a pair of common spiders, Arabella and Anita. The experiment was to determine the spiders' ability to spin a web without the influence of gravity. It was one of the student experiments coordinated by the Marshall Center for Skylab.

The third Skylab crew went into space on Nov. 16 and splashed down in February 1974, setting a new endurance record and reflecting man's ability to live and work in space for extended periods of time.



A modified Saturn V lifts Skylab toward the heavens on May 14, 1973.

Skylab received official name in 1970

In 1970, the official name "Skylab" was assigned to one of the most important projects in the history of the Marshall Center that would result in America's first space station.

The origins of Skylab go back further than 1970. During the 1960s, NASA moved forward to accomplish the Apollo lunar landing missions, but it also studied ways to build future spacecraft that could stay in space for longer periods of time and accomplish more detailed scientific objectives.

The planning revolved around making maximum use of Apollo technology. Such studies began in the mid-1960s under such titles as "Extended Apollo (Apollo X)" and the "Apollo Extension System (AES)." In 1965, NASA grouped such studies under the "Apollo Applications Program." At the time, these names were considered somewhat uninspiring.

In reality, what NASA wanted to build after Apollo might have been called a "space station." But that term brought huge dollar signs to the minds of the

nation's political leaders at a time when the United States was pouring massive expenditures into the war in Vietnam and assigning new priorities to its domestic needs.

Trying to call the program "Apollo Applications" just didn't work, according to Skylab historians David Compton and Charles Benson. "AAP" became the butt of frequent jokes. Opponents referred to it as "Almost a Program" and as "Apples, Apricots and Pears." According to

See Name on page 3

The story of a rescue in space

Marshall, NASA team saved Skylab

Trouble began approximately 63 seconds after a Saturn V launched the Skylab Workshop-Apollo Telescope Mount combination on May 14, 1973.

A panel protecting the orbital workshop from micrometeoroids and solar radiation ripped off. Adding to the trouble, one of the solar arrays for the workshop was torn away and a second array was only partially deployed once in orbit.

The solar arrays were designed to provide electrical power to the orbital workshop. The solar arrays for the Apollo

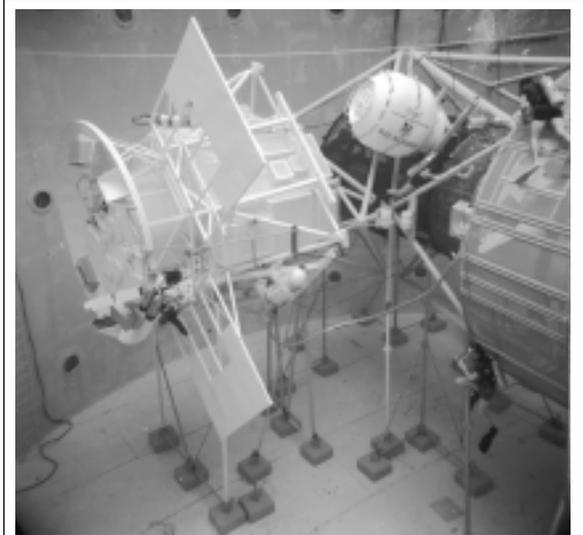
Once in orbit and without the micrometeoroid panel, air temperature inside the workshop quickly began approaching 130 degrees Fahrenheit. Engineers from Marshall and throughout NASA were concerned about the condition of food, film and other equipment inside Skylab. They also worried about plastic insulation material inside the workshop and possible toxic gases if temperatures rose too high.

H. Fletcher

Kurtz, now retired from Marshall, was head of the Center's Mission Operations Office at the time. Kurtz and others began organizing activities at the Huntsville Operations Support Center.

"I quickly became a landlord with about 100 unhappy guests," Kurtz said. "The chain of command went out the window as increasingly senior managers moved into key positions in the HOSC, working directly with those concerned with the rescue."

Skylab, seriously overheating, was maneuvered through varying nose-up attitudes that would best maintain an acceptable "holding condition." For 10 days, and for some time thereafter, the



Practicing a Skylab 'space walk'

Ed Gibson, center, in the astronaut suit, practices a "space walk" on a mockup of the Apollo Telescope Mount on Skylab in the Marshall Center's Neutral Buoyancy Simulator in 1970.



A crippled Skylab in orbit with its heat shield gone, one solar wing gone, and the other solar wing not deployed.

Telescope Mount remained intact.

"It was obvious Skylab was in big trouble," said retired Marshall team member Luther Powell.

Name

Continued from page 2

Compton and Benson, one editorial cartoon showed two Martians observing the AAP space station. One with a puzzled expression was telling the other, "I don't know what the hell it is, but I think they call it AAP."

NASA Administrator Thomas Paine decided to remedy the situation. At his direction, a committee considered nearly 100 names and recommended eight — four from mythology and four from American history. In reality, the commit-

tee passed over the recommendations and selected, instead, a name submitted by Lt. Col. Donald Steelman, an Air Force officer on duty with NASA in 1968.

space station operated on less than half of its designed electrical system. All this meant one thing — the first Skylab crew, scheduled for launch May 15, would be delayed until methods could be devised to repair and salvage the workshop. Teams at the Marshall Center, and other NASA centers, who had put years of planning into Skylab, began quickly working to save it. A trouble-shooting team was formed in the Huntsville Operations Support Center from existing support teams. Other space center and industry personnel joined those already in Huntsville. Some personnel did not leave their posts for several days.

Marshall veteran manager George Hopson, and now-retired and former Center Director Dr. J. Wayne Littles, co-managed a Thermal, Environmental

See Rescue on page 4

tee passed over the recommendations and selected, instead, a name submitted by Lt. Col. Donald Steelman, an Air Force officer on duty with NASA in 1968.

"Skylab" was a contraction for "Laboratory in the Sky" and was quickly accepted within, and outside of, NASA.

Rescue

Continued from page 3

Control and Life Support team. Littles can recall the many hours that his team members, and members of other teams, dedicated to the repair effort.

“That first ‘day’ for many of us was 44 hours long,” Littles said. “Hopson and I eventually arranged a work schedule of 18 hours on duty, six hours off. We operated in this mode, seven-days-a-week, for six weeks.”

While one team jockeyed Skylab in the nose-up attitude, two others, one led by Marshall retiree Robert J. Schwinghamer, and another led by now-retired Marshall Center Director J.R. Thompson, worked to develop a shield to shade Skylab and enable temperatures to be maintained without constant repositioning.

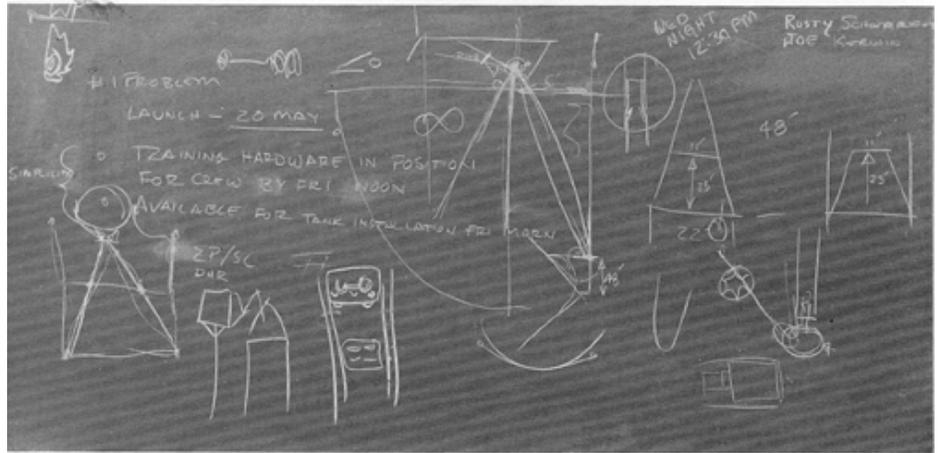
“NASA was presented with several



Delores Zerolles, front, and Ceal Webb, rear, employees of ILC Industries of Dover, N.J., sew a solar shield for the Skylab sunshade May 21, 1973.

possible designs,” Thompson said. “These had to be evaluated, tested and a choice made in less than 10 days.”

Charts were set up and updated hourly on tests related to the quality of air on Skylab and the progress being made



Blackboard at the Marshall Center following the “skull session” where the idea for a twin-pole sunshade for Skylab was originated May 16, 1973.

developing the shield. More than a few nights, Schwinghamer said, were spent sleeping on his office floor. The assembled group ranged from design, materials, manufacturing, and simulation specialists

from Marshall, to procedures and stowage personnel from Johnson Space Center. Also present were sail-making seamstresses from New Jersey with their stitching machines and astronauts with a command module simulator flown in from Houston.

Over the next several days, Marshall considered a variety of repair options. Eventually, three methods were developed, tested, rehearsed, and approved. Marshall

was intensely involved in all three — a parasol sunshade, a twin-pole sunshade, and a set of metal cutting tools for freeing the jammed solar array. Marshall, however, had the lead role in developing the twin pole sunshade and the tools. Skylab

astronauts Charles Conrad and Joe Kerwin arrived at the Marshall Center from Kennedy Space Center in Florida to test solutions as they were developed and to practice in Marshall’s Neutral Buoyancy Simulator. At the Kennedy Space Center, the astronauts’ Saturn IB rocket was kept on immediate standby to carry the rescuers and their equipment to Skylab.

At 8 a.m. on May 25, the first crew, whose mission was called “Skylab 2,” was launched from the Kennedy Space Center with astronauts Conrad, Kerwin and Paul Weitz headed toward the orbiting workshop. The rendezvous occurred at 3:30 that afternoon. On the following day, May 26, the crew began to deploy the solar parasol — an orange vipstop nylon-Mylar shade folded against a telescopic pole — through the solar airlock on Skylab, allowing them to avoid an extravehicular activity.

Temperatures began to drop and the crew began to activate the new space station, which was safe and contamination free.

On June 7, the astronauts, working outside of Skylab, used a technique developed at Marshall to successfully cut the strap that had prevented deployment of the remaining solar array.

Looking back on Skylab, Thompson said, “I can’t single out individuals during Skylab’s rescue. We all remember key players, but in the final analysis, it was the NASA team that saved Skylab.”

The Skylab astronauts comment on their experiences

Editor's note: The Skylab mission transcripts are huge documents — each about the thickness of a New York City telephone book. The transcripts and other NASA documents contain hundreds of quotes from the Skylab astronauts — too many to publish in a single article. Here, however, are a few selected quotes from each astronaut:

• **Charles “Pete” Conrad Jr.**, as he and his crewmates approached Skylab: “Tallyho, the Skylab. We got her in daylight at 1.5 miles, 29 feet per second.”

• **Paul Weitz**, trying with his other crewmates to pry loose a strap holding the Skylab solar wing beam: “We pulled as hard as we could on the end of the Solar Array System panel. We’re all trying to break it loose. It’s only a half inch strip, but man, is it riveted on?”

• **Joe Kerwin**, commenting on the weightlessness of space: “If you go from one module into the other and you’re



Astronaut Owen Garriott retrieves film during an extra-vehicular activity outside of Skylab on July 28, 1973.

upside down, you just say to your brain, ‘Brain, I want to be that way to be up.’ And, your brain says, ‘OK, then that way is up.’”

• **Alan Bean**, commenting on the importance of Skylab: “Space is our

frontier and beginning its exploration may be our generation’s greatest contribution to human history.”

• **Owen Garriott**, talking about spider Arabella and her role in the Skylab student experiment: “It seems she learned very rapidly in zero g without the benefits of any previous experience.”

• **Jack Lousma**, speaking eight hours after launch and approaching Skylab, “Here’s our home in the Sky.”

• **Bill Pogue**, offering his personal observation on the meaning of Skylab: “I now have a new orientation of almost a spiritual nature. My attitude toward life and toward my family is going to change.”

• **Gerald Carr**, speaking seven hours after launch and spotting Skylab: “She looks pretty as a picture.”

• **Edward Gibson**, commenting on his departure from Skylab, “It’s been a good home. I hate to think we’re the last guys to use it.”

Spiders in space

When the second crew headed for the orbiting Skylab workshop on July 28, 1973, one of the many experiments taken with them included two common Cross spiders named Arabella and Anita.

The purpose of the experiment was to see if the spiders could spin webs in the near weightlessness of space and how the webs’ shape and texture would be affected.

The experiment was the idea of Judith Miles, a high school student from Lexington, Mass. She was inspired by an article she read in National Geographic magazine detailing how spiders spun intricate webs.

Spiders can live about three weeks without food but need plenty of water. Prior to launch, each spider was fed a housefly, and had a water supply next to their specially constructed cage.

Astronaut Owen Garriott worked with the two spiders while in orbit. At first, the spiders did not do well at spinning webs. After a couple of days in space, they adapted to their environment and began spinning webs. The experiment lasted about five days. The webs spun in space were significantly finer than those spun on Earth, which proved that the spiders used a weight-sensing ability to size their thread.



“Arabella,” or “Anita,” spinning a web on Skylab

Both spiders died while in space of apparent dehydration. It was later determined that the water supply system was not sufficient for the two spiders.

The experiment with Arabella and Anita provided Miles with a great deal of attention within NASA and from the world press at the time, since her experiment proved that biological experiments were compatible with human space flight.

Historical sources for Skylab missions abound

It's been 30 years since Skylab. It's an adventure that many Marshall team members may have first heard about while they were in school.

Today, many Marshall team members still seek information regarding Skylab's technical development as well as its scientific achievements. Although a complete bibliography of Skylab would total hundreds of pages, it is possible to cite a few publications that may be useful to Marshall team members who need information relative to America's first space station.

In 1983, NASA published "Living and Working in Space, A History of Skylab," by W. David Compton and Charles D. Benson. The book examines early concepts and the development and preparations to fly during the late 1960s and early 1970s. It also traces the results of three manned Skylab missions.

One of the most valuable sections of the book is the detailed bibliography. Marshall team members seeking information on Skylab may want to use the bibliography as a first step in identifying a particular report or document.

NASA Technical Memorandum 64813, "MSFC Skylab Orbital Workshop," is a five-volume set published by the

Marshall Center in May 1974. The volumes deal with system design, performance, materials, reliability, safety, testing, mission support, engineering management and dozens of other topics.

There are hundreds of other technical memorandums related to the Skylab program.

Less detailed is a Skylab series that the Marshall Center published following the actual missions. This set is part of the NASA Special Publication series and the titles are indicative of the subject matter covered. Among the titles are:

- "Skylab, Our First Space Station"
- "A New Sun, The Solar Results from Skylab"
- "Skylab's Astronomy and Space Sciences"
- "Skylab, Classroom in Space"

Also available are various Skylab chronologies published by the Marshall Center and NASA.

In 1974, the Marshall Center published report M-GA-74-6, "A Catalog of Skylab Information." Although many Skylab reports and papers were published after this date, the catalog represents a good one-stop guide to reports, publications and other items related to Skylab.



Summary of Skylab accomplishments

Editor's note: When Skylab was launched, the mission was designated "Skylab 1." The first crew to arrive at Skylab was designated "SL-2," the second crew "SL-3" and the third crew "SL-4."

Experiments	SL-2 Hours	SL-3 Hours	SL-4 Hours	Total Hours	Events Planned	Events Accomplished	%
Solar Astronomy	117.2	306.1	519.0	941.3	879.5 hours	941.3	+7.1
Earth Observations	71.4	223.5	274.5	569.4	62 passes	99	+60
Student	3.7	10.8	14.8	29.3	44	52	+18
Astrophysics	36.6	103.4	133.8	274.2	168	354	+105
Man/Systems	12.1	117.4	83.0	212.5			
Material Science	5.9	8.4	15.4	29.7	10	32	+220
Life Science	145.3	312.5	366.7	824.5	701	922	+32
Comet Observation			156.0	156.0			
EVA time	6.33	13.2	22.2	42.2			

Crew members of America's first space station have solid place in history

A short biography of the Skylab astronauts

First crew:

• *Charles "Pete" Conrad Jr.* — A former Navy test pilot, he was chosen as a NASA astronaut in 1962. His first flight was on Gemini V, and he commanded Gemini XI. He was the commander of Apollo 12 and became the third man to walk on the moon in November 1969. He was commander of the first Skylab crew in 1973. He died in a motorcycle accident in 1999.

• *Paul Weitz* — A former Navy fighter pilot, he was chosen as a NASA astronaut in 1966. His first mission was on the first Skylab crew in 1973. He was the spacecraft commander for STS-6 on the maiden flight of the Space Shuttle Challenger in 1983. He retired as deputy director of Johnson Space Center in 1994.

• *Dr. Joseph Kerwin* — A Navy doctor and pilot, he was selected as a NASA astronaut in 1965. He was the science-pilot for the first Skylab crew. He retired from NASA in 1987 and went into private business.

Second crew:

• *Alan Bean* — A former Navy pilot, he was selected as a NASA astronaut in 1963. He was the lunar module pilot on Apollo 12 and became the fourth man to walk on the moon. He was the commander of the second Skylab crew. He left NASA in 1981 and is now a full time artist.

• *Owen Garriott* — A professor in electrical engineering at Stanford University, he was selected as a NASA scientist-astronaut in 1965. He was a scientist on the second Skylab crew. He later flew in STS-9 — the first Spacelab mission — in 1983. He left NASA in 1986 and is a consultant living in Huntsville.

• *Jack Lousma* — A former Marine pilot, he was selected as a NASA astronaut in 1966. He was the pilot for the second Skylab crew. He was the commander of STS-3, the third shuttle test flight, in 1982. He left NASA in 1983 to work in private business. He lives in Michigan.

Third crew:

• *William Pogue* — A former Air Force pilot and Thunderbird, he was selected as a NASA astronaut in 1966. He was the pilot for the third and last Skylab crew. This was his only space flight. He left NASA in 1975 and works as a consultant.

• *Edward Gibson* — A scientist with his doctorate specializing in solar physics, he was selected as a NASA astronaut in 1965. He was a science-pilot for the third and last Skylab crew. He left NASA in 1974 and formed his own consulting company.

• *Gerald Carr* — A former Navy pilot, he was selected as a NASA astronaut in 1966. He was the commander of the third and last Skylab crew. This was his only space mission. He left NASA in 1977 and went into private business.

Skylab astronauts to visit Marshall team Nov. 10 during anniversary events

from the Government and Community Relations Department

Eight of the nine astronauts who flew aboard Skylab will meet with Marshall team members Nov. 10 at 12:45 p.m. in Morris Auditorium as part of the 30th anniversary celebration of America's first space station.

The astronauts also will commemorate Skylab's three historic missions during the following events in Huntsville on Nov. 10:

• Education outreach sessions with the astronauts in area schools including Huntsville City Schools, Madison County and Madison city schools via distance learning facilities, and to schools statewide by Web cast.

• The 2003 Von Braun Forum, beginning at 2 p.m. in the Chan Auditorium in the Administrative Science Building on the campus of the University of Alabama in Huntsville. This year's forum will consist of a special 30th anniversary Skylab video and panel discussions

addressing the science performed aboard Skylab, the rescue of Skylab, and the world records set during the three missions. The event is open to the public and admission is free.

• At the conclusion of the Von Braun Forum, a special Skylab collection will be formally opened in the lobby of the UAH Salmon Library adjacent to the Administrative Science Building at 4 p.m.

• The astronauts also will participate in a 30th anniversary Skylab video and panel discussion in the IMAX Theater of the U.S. Space & Rocket Center at 5:30 p.m., followed by a reception in the museum at 7 p.m. The Space & Rocket Center events are open to the public and cost is \$20 for the reception and \$40 for the reception and IMAX Theater event.

Reservations to the evening events may be made online at www.hsvchamber.org, by calling 1-256-535-2031, by e-mail at tleopold@hsvchamber.org, or by mail to the Chamber of Commerce, Attn: Govern-

ment Affairs, P.O. Box 408, Huntsville, AL. 35804.

What happened to Skylab?

by David Hitt

Skylab was expected to stay in orbit for eight to 10 years after the last crew left in 1973.

NASA originally planned for the Space Shuttle to visit the station but its orbit decayed until it re-entered the Earth's atmosphere and disintegrated -- dispersing debris across a sparsely populated section of western Australia and the southeastern Indian Ocean. Australia reportedly fined NASA \$400 for "littering."

Hitt is a science writer for the NASAexplores education initiative at the Marshall Center.

Space Transportation Directorate celebrates

The Marshall Center's Space Transportation Directorate held an "Oktober Fest" appreciation and awards celebration recently to recognize employee accomplishments.

About 500 team members participated in volleyball, horse-shoes and "spoon and egg" competitions including a "Bosses' Relay event.

Among the awards were "Igniter awards," Innovator awards," "Above and Beyond awards."

The event was held at the U.S. Army Pavilion by the Rustic Lodge on Redstone Arsenal.



Photos by Doug Stoffer, NASA/Marshall Center

Marvin Williams, Mike Allen and other team members go for the hoops.



Space Transportation Deputy Director Chris Singer, left, announces award winners during the "Oktober Fest."



Eyes are on the ball during the final match of the day.



Hula-Hoops await willing participants in the "Big Boss Relay"



Deledia Perry, left, demonstrates the proper form in the "Egg and Spoon" competition to Rebecca Farr.

employee achievements with 'Oktober Fest'



Managers get ready to participate in the "Big Boss Relay."



Rosemary Finley puts a spin into the Hula-Hoop contest.



These team members take a break during the festivities.



The winners of the "Egg and Spoon" contest, from left, Kevin Baker, Andy Chissam, Richard Stroud and Scott Maddox, celebrate their feats of dexterity.



TD40 and TD70 team members face off during the final volleyball match. TD70 won.

Life in space aboard Skylab no ordinary job

Marshall Center celebrates 30th anniversary of Skylab



Astronaut Owen Garriott at the control and display panel onboard Skylab's orbital workshop.

Photos provided by Marshall Imaging Services



The interior of the Skylab orbital workshop.



The "Elbow Prominence" photographed by Owen Garriott while observing a small flare near the sun.



Charles "Pete" Conrad Jr. pedals a stationary bicycle while exercising onboard Skylab.



Skylab in orbit with its solar shield in place and solar array fully deployed.



Skylab's final flight path as it disintegrated on reentry.

'Sister act' follows dreams to support International Space Station

by Lori Johnston

When Gloria Cade Reiswig was single-handedly raising her two daughters in the 1960s, she didn't know she was contributing to the future exploration of space.

Rita Sutton and Roxanna Sherwin grew up along with America's space program, which was just beginning at the Marshall Center in their hometown of Huntsville.

"When I was a kid, my mother took us to visit the space museum with the rocket displays, pictures and history of Redstone Arsenal," Sutton said. "She made sure my sister and I watched when Americans landed on the Moon. When I saw Neil Armstrong take those first steps, I knew something special was happening and that Huntsville would be a big part of that history."

And so did her big sister, Roxanna.

"Our mother encouraged our curiosity, so it was only natural that we wanted to be part of the greatest exploration of the 20th century," Sherwin said. "We know Mother is proud that we are now supporting research on the International Space Station that will help not only improve astronaut health in space but also will provide fundamental knowledge that improves medical treatments on Earth."

Both sisters are living their dream by working with the International Space Station — the orbiting laboratory being built by NASA and 15 international partner nations. Rita and Roxanna work in NASA's Payload Operations Center — the command post at the Marshall Center for all science activities onboard the Space Station.

To this day, the sisters claim "dual citizenship" in Huntsville, and in the small Alabama town of Opp, just south of Montgomery, where they spent their early childhood. In 1964, their mother decided to take her daughters to Huntsville for a better job with RCA and provide the girls with more opportunities. The sisters would return to Opp each summer to spend time with their grandparents, James and Wilma Cade.

"Being from a small town gives you certain perspectives and advantages. Opp is that sleepy kind of town that is the complete opposite of Huntsville," Sutton recalled. "Opp offered security and Huntsville offered excitement, to young girls anyway. That bouncing back and forth gave you the best of both worlds."

They both went on to graduate from Butler High School in Huntsville, and Athens State College in Athens — Sutton with a bachelor's degree in psychology and history, Sherwin with a

bachelor's degree in business management.

Although they took different paths in getting to NASA, the "sister act" is now on the same "stage," working for the NASA support contractor Teledyne Brown Engineering. Sutton develops procedures designed to help the Station crew operate a payload

experiment and works on the console support team sending science experiment procedures to the astronauts and cosmonauts. Sherwin is the manager for the Operations and Integration team that supports payload operations directors — the payload version of a Space Shuttle flight director.

Sherwin moved to Houston in 1978 to work with the Space Shuttle

program at Johnson Space Center after getting her career started as a cooperative education student in mechanical engineering for the Army at Redstone Arsenal. Sherwin got a later start, choosing first to home-school her three daughters before joining the space program in January 2000.

But don't think just because Sherwin's job is focused on the future and the unknown, she isn't interested in preserving the past. In fact, she spends her spare time quilting, crocheting and making her own fishing rods — not to mention enjoying life with her husband, Charles.

When she's not helping to support crews in space, Sutton works as a hospice volunteer, helping families cope with end-of-life issues. This is near to her heart, since her mother recently passed away after suffering from pulmonary fibrosis — a progressive lung disease. Before her death, she was under hospice care.

"Contributing is very important to our mother, and is a lesson we took to heart," Sutton said. "Contributing to our family, our community and our society have always been in our background. You could look at our jobs as a method of contributing. The information being gathered from research on the Station is for us, for our families."

This family tradition doesn't stop at the sisters, though. It continues on with Sutton's daughter Chrissy, and son-in-law, Scott Stinson, who both work at the Johnson Space Center.

Both sisters take pride in the way their mother has contributed to the space industry by directing her side of the family tree to grow toward the Sun — and reach for the stars.

The writer, employed by ASRI, supports the Media Relations Department.



Marshall Imaging Services

Sutton, Rita, left, with Sherwin, Roxanna in the Payload Operations Center for the International Space Station.

Lab

Continued from page 1

and chemicals derived from life. NASA's partners are Stanford University in Stanford, Calif., Nanogen Inc. in La Jolla, Calif., and the University of California in Irvine, Calif.

"This type of technology will enhance the International Space Station capability as a biological laboratory with greatly increased throughput and state-of-the-art techniques," said G. Scott Hubbard, director of the NASA Ames Research Center at Moffett Field, Calif. "Someday, this technology could allow astronauts or robots to search for life on other planets or moons."

To process the CDs, the researchers adapted a suitcase-sized prototype instrument undergoing laboratory trials at Ames. There are two versions of the CDs, which are about the same size as music CDs. One is plastic, similar to a standard CD, and is disposable. The other is made of glass and is reusable.

"These tiny labs on CDs allow you to do thousands of tests of biological samples quickly and in the field," said Michael Flynn, a scientist at ARC. "On the Space Station, the types of tests you would do are DNA analyses."

To begin a test, a scientist places a liquid sample into a small opening near the center of the CD. The researcher puts the disc in the prototype machine that spins the CD. Centrifugal force spreads the sample fluid from the center of the CD through tiny, capillary-like pipes and valves towards the outer edges of the disc and several clear observation areas.

During the journey, special dyes in the CD combine with the sample. The dyes glow when exposed to specific proteins and other chemicals, including particular portions of DNA. The instrument shines a specific color light on the specimen, and if it glows in another specific color, the specimen contains the substance the dye was designed to detect.

The CD system can even sample water, and the instrument's software has image analysis capability that can discriminate between cells and debris. A microscope and digital camera built into the prototype instrument take images of the glowing test sample in the clear observation area after the disc stops spinning.

"There are already thousands of fluorescent test solutions available for conducting biological tests on bacteria, proteins, viruses and other life-related chemicals," Flynn said. "The lab-on-a-CD system allows us to automate a process that traditionally was very time-consuming and expensive."

The next step in evaluation of the prototype is to develop more tests to determine how well the device works. Eventually,



Photo by Emmett Given, NASA/Marshall Center

Doing business with NASA

Stan McCall, left, small business specialist for the Marshall Center, tells Trudy Jo Ware, center, and her husband, Wayne Wright, about requirements for doing business with NASA and the Marshall Center during a recent Business Partnering and Opportunities Conference at the Von Braun Center. Ware is president of NATIVESUN Inc., a human resources company based in Scottsdale, Ariz.

researchers want to add a multi-disk changer to the instrument, so it can test several CDs.

"We have worked with many different commercial vendors and individuals to combine a variety of commercially available technologies into an integrated microgravity-compatible instrument," Flynn said.

Potential spin-offs could be clinical uses in hospitals, physicians' offices and laboratories.

NASA's Fundamental Space Biology Division in the Office of Biological and Physical Research in Washington, funds this research.

NASA SES Candidate Development Program open until Friday

The NASA Senior Executive Service Candidate Development Program is accepting applications until Friday.

The program is for GS-14 and GS-15 federal employees who have potential for assuming executive responsibilities. The program can be completed on a part-time basis during a 12-18 month period.

Applicants must apply on "NASA Stars." If a resume is already on file, apply through "Quick Apply." Required supplemental information can be provided in the "Other Information" section of Resume Builder. For information, call Deidra Williams at 544-5721.

Safety

Continued from page 1

The CAIB Agency-Wide Action Team was chartered with identifying all of the CAIB findings, observations, and recommendations that have Agency-wide implications, and drafting a response to each of these items.

Marshall team members will be asked to read the CAIB report and the CAIB Agency-Wide Action Team recommendations. Supervisors then will lead small group meetings to discuss relevant issues and provide an opportunity for all team members to make recommendations for solving the issues. This small group feedback will be initially consolidated into a directorate-office response, and ultimately into a Center-level response.

Each civil service directorate or office has identified an organizational point of contact that will coordinate with their management in identifying exactly how their organization will participate in the Safety & Mission Success Week activities. The participation of all Marshall team members in this activity is essential.

Additional details will be provided in next week's issue of the Marshall Star.

The writer is the Safety & Mission Success Week team lead at the Marshall Center.

STS-107

Continued from page 1

spirits of the crew. Now, as we stand before this lovely memorial, we must

remember that it is not a memorial to the past but a testimony to the future."

John Young, currently serving as an

associate director at Johnson Space Center, commanded Columbia on STS-1. In paying his respect to the crew of STS-107 and the family members attending the ceremony, he emphasized that America is not finished with space exploration.

"From those launch pads right over there," Young said, gesturing to where Columbia lifted off on Jan. 16, "the future is waiting for us."

Evelyn Husband, widow of Rick Husband, and William Readdy, NASA associate administrator for Space Flight, laid a wreath at the foot of the Space Mirror. The silence was broken moments later as four T-38 jets, piloted by astronauts, pierced the sky over Kennedy Space Center in the Missing Man Formation.

To learn more about the Astronauts Memorial Foundation, visit: <http://www.amfcse.org>.

Columbia Accident Investigation Board report available online

The Columbia Accident Investigation Board report on the STS-107 accident is available online at "Inside Marshall," www.nasa.gov and at www.caib.us.



Photo by David Higginbotham, NASA/Marshall Center

Helping the disabled reach their full potential

David Brock, Marshall's industry assistance officer, tells Center team members his personal story on overcoming a disability. Brock spoke during a presentation last week during "Disabilities Awareness Month." Brock was 21 in 1973 when he was diagnosed with a condition that would lead to blindness within 10 years. He said the greatest challenge facing the disabled is not the disability itself, but other people's perception of the disability. "All the disabled need is someone to care, someone to reach out and lend a helping hand, someone to step up to the task and become a mentor," Brock said.



Photo by Doug Stoffer, NASA/Marshall Center

Having a hands-on experience at Marshall

Students from the Tennessee School for the Blind in Nashville, Tenn., get a hands-on experience touching an RL-10 rocket engine from the Apollo era during an Oct. 24 visit to the Marshall Center. Marshall engineer Jeff Hamilton, right, helped guide the students on the tour, which included the historic Redstone Test Stand and an experimental engine firing at Test Facility 116 in the East Test Area. "They were just amazed by all the things they could hear -- every pump, valve, siren, bell and chime," Hamilton said. "It was inspiring to me to tour them around the Center. They were so interested in everything we do here. It was truly a chance to help inspire the next generation."

NASA announces research grants in fundamental physics

NASA Headquarters release

NASA has selected 15 researchers to receive grants totaling more than \$6.4 million over four years, to conduct space fundamental physics research. This research is expected to expand our understanding of space, time and matter.

Sponsored by NASA's Office of Biological and Physical Research, the research offers investigators the advantage of a low-gravity and space environment to enhance understanding of physical and chemical processes associated with fundamental physics.

Researchers will be able to use NASA's microgravity research facilities such as drop-tubes, drop-towers, aircraft and sounding rockets. All 15 grants are for ground-based research. Four are to continue work currently being funded by NASA, while the remaining 11 represent new research efforts.

NASA received 29 proposals in response to this research announcement. The proposals were peer-reviewed by scientific and technical experts from academia and government. A list of

Job Announcements

MS04D0030, AST, Aerospace Materials. GS-0806-14, Space Shuttle Propulsion Office, External Tank Project, Michoud Assembly Facility. Closes Nov. 14. Contact: Edwina Bressette at 544-8115.

MS04D0031, AST, Aerospace Materials. GS-0806-14, Space Shuttle Propulsion Office, External Tank Project, Michoud Assembly Facility. Closes Nov. 14. Contact: Edwina Bressette at 544-8115.

MS04D0032, AST, Electrical Power Systems Program. GS-0850-14, Space Shuttle Propulsion Office, Solid Rocket Booster Project. Closes Nov. 14. Contact: Edwina Bressette at 544-8115.

MS04C0033, Management Support Assistant (OA). GS-0303-07, Office of the Chief Financial Officer. Closes Nov. 7. Contact: Dana Blaine at 544-7514.

MS04D0035, AST, Technical Management. GS-0801-14, Second Generation RLV Program Office, Program Planning and Control Office. Closes Nov. 7. Contact: Patricia Caraway at 544-7755

MS04D0037, AST, Navigation, Guidance, and Control Systems. GS-0861-11, Space Transportation Directorate, Vehicle & Systems Development Department. Closes Nov. 12. Contact: Jim Bramblett at 544-3398.

MS04D0038, AST, Navigation, Guidance, and Control Systems. GS-0861-07, 09, Space Transportation Directorate,

Vehicle & Systems Development Department. Closes Nov. 13. Contact: Jim Bramblett at 544-3398.

MS04C0039, Executive Support Assistant (OA). GS-0303-08, 09, Office of the Director, MSFC. Closes Nov. 7. Contact: Kevin Plank at 961-0157.

MS04D0044, AST, Aerothermodynamics. GS-0861-11, Space Transportation Directorate, Subsystems & Component Development Department. Closes Nov. 17. Contact: Jim Bramblett at 544-3398.

MS04D0047, AST, Solid Propulsion Systems. GS-0861-13, Space Transportation Directorate, Vehicle & Systems Development Department. Closes Nov. 17. Contact: Jim Bramblett at 544-3398.



Photo by David Higginbotham, NASA/Marshall Center

Pitching in during CFC Community Service Days

Marshall team member Rene Holden is reflected in the mirror while Sandra Leibold vacuums a wall at Blount Hospitality House in Huntsville during the Combined Federal Campaign recent Community Service Days. Blount Hospitality House serves families of hospitalized patients by providing a more "home-like" atmosphere. With two weeks to go in the campaign, Marshall team members have pledged more than \$444,000. The Marshall Center's campaign goal this year is \$500,000.

awardees by state, their institutions and research titles, is available at: http://www.nasa.gov/home/hqnews/2003/oct/funphys_award_list.html. For more information about NASA's space research on the Internet, visit: <http://spaceresearch.nasa.gov/>

Center Announcements

Big Brothers-Big Sisters event set for Nov. 14-16

The Big Brothers-Big Sisters annual fund-raising campaign this year features "Bowl for Kids Sake" on Nov. 14-16 at Monarch Lanes on Bob Wallace Avenue in Huntsville. For more information, call 880-2123 or go to www.bbb-sna.com or call Teresa A. Foley-Batts at 544-0335.

HEDS course nomination forms due Nov. 24

Nomination forms for the Human Exploration and Development of Space course are due Nov. 24, or as soon as possible, to Georgann Freeman in CD20. The event, to be held Jan. 12-16, will be at Wallops Flight Facility in Virginia. For more information, see "Inside Marshall."

Ergonomic evaluations and tips available at Web site

Ergonomic evaluations and tips are available at <http://health.msfc.nasa.gov/enviro.html> for Marshall team members. The Web site offers tips to make your office ergonomically correct and exercises that you can perform in your office to help keep muscles loose. Team members also can request an ergonomic evaluation online.

IT security training mandatory for Marshall team members

Marshall team members, civil service and contractor, are required to take either "Basic IT Security for 2004" or "IT Security for Managers 2004." To complete the training, go to <https://solar.msfc.nasa.gov/solar/deliver/public/html/newindex.htm>.

Veterans Day participants needed for Huntsville parade

The Marshall Center will participate in the annual Veterans Day parade in Huntsville on Tuesday. Marshall team members who want to participate should arrive at 10 a.m. at the empty lot beside

the old Coca-Cola plant on Clinton Street in downtown Huntsville. The parade will begin at 10:55 a.m. and will head east on Clinton Street. For more information, call Shelvie Miller a 544-0090.

AIAA Great Paper Airplane Contest set for Friday at UAH

The American Institute of Aeronautics and Astronautics will host the 10th Annual Great Paper Airplane Contest from 3:30-5:30 p.m. Friday in the University Center Exhibit Hall at the University of Alabama in Huntsville. There are categories for all age groups and awards will be presented. Participants can enter paper airplanes in the following categories: aerobatics, time of flight, distance, accuracy, and artistic. For more information, call Rose Allen at 544-0117.

Von Braun Astronomical Society to present star program Nov. 15

NASA astronomer Jessica Gaskin will present "The Astronomy Mythos" at 7:30 p.m. Nov. 15 at the Wernher von Braun Planetarium on Monte Sano Mountain in Huntsville. The program is hosted by the Von Braun Astronomical Society and will feature examples of legendary figures in the sky and how cultures from around the world have viewed our universe across the centuries. Cost for non-members is \$3 for adults and \$2 for children 12 and under. If weather permits, a "Star Party" will take place using the society's telescopes. For more information, call Mitzi Adams at 961-7626.

'Use or lose' annual leave must be scheduled before Nov. 30

Marshall team members with "use or lose" annual leave must be scheduled before Nov. 30, since the leave year ends Jan. 10. Leave should be submitted through WebTads, by e-mail or by other means but it must be in writing. For more information, see "Inside Marshall" or call Mack Blackman or Rick Wallace.

Facilities Office employees to meet Tuesday

Facilities Office employees, retirees and friends will meet at 8 a.m. Tuesday at Shoney's restaurant on University Drive at Memorial Parkway in Huntsville. For more information, call Carl Gates at 232-2695.

NASA Day set for Nov. 22 at Alabama A&M University

All Marshall employees are invited to the Alabama A&M vs. Arkansas-Pine Bluff football game at 1:30 p.m. Nov. 22 for High School/NASA Day. Free admittance with badge is through the pass gate only. General admission tickets for family members are also free and available in the Government and Community Relations Office in Bldg. 4200, Room 828Y. For more information, call Rosa Kilpatrick at 544-0042.

American Indian Heritage Month events set at Marshall

In conjunction with American Indian Heritage Month during November, the Marshall Center will host a heritage celebration at 10:30 a.m. Wednesday in the lobby off Bldg. 4200. Marshall Deputy Director Rex Geveden will speak on his Indian heritage. There also will be traditional dancers. On Nov. 17, NASA astronaut John Herrington will visit the Center and speak to Marshall team members at a 10:30 a.m. ceremony in Morris Auditorium. Herrington is the first American Indian astronaut and flew on STS-113 in 2002 to the International Space Station.

NASA Ski Week set for January

The 13th annual NASA Ski Week will be in Steamboat, Colo., Jan. 24-31. Skiers from nine NASA centers will participate in winter sports and camaraderie at the 3,000-acre resort. All Marshall team members, retirees and family members, are eligible to participate. For more information, call 233-0705 or e-mail tom.dollman@nasa.gov.

Classified Ads

Miscellaneous

- ★ Two rolls, 660', new field fencing, rolled 30' pieces, \$100; many new t-posts. 461-8369
- ★ 2002 Yamaha PSR-GS76 keyboard, 2 software packs, MIDI cables, stand, adapter, pedal, \$295. 534-3252
- ★ Lady's cowboy boots, made by Justin, brown, size 6B, genuine lizard, \$45. 880-7490
- ★ Imoega external zip drive w/3 disk, \$10. 325-6000
- ★ Wooden swing set includes fort, 2 swings and slide, \$200. 722-8116
- ★ Anvil flight case, 13.25"H, includes DOD R-830A 15-band stereo graphic EQ, \$100. 489-5464
- ★ Prefabricated fireplace and flue, used for gas logs, \$75. 864-2629
- ★ Weimaraner puppies, AKC, vet checked, 8 wks. old, will hold for Christmas. 539-4902 after 5 p.m.
- ★ Whirlpool extra-large capacity electric dryer, 7-cycle, wrinkle shield, almond color, \$100. 430-2796
- ★ Blue, 4-wheel, 2-horse trailer w/brakes, new paint, floor, pads, wheels. 479-3660
- ★ Apple iBook laptop computer, 500MHz, 10GB HD, 640MB RAM, DVD-ROM drive, network card, \$795. 325-5646
- ★ Shotgun, EAA MP-153, 12-gauge, 3-1/2" auto, wood stock, w/swivels & 3 chokes, \$350. 379-3606
- ★ Sears Kenmore Frostfree refrigerator, almond, 19.1 cu. ft., \$100. 880-7376
- ★ Two tickets, Jesus Christ Superstar, VBC, 11/29, 8 p.m., front row A33/34, \$35 ea. 882-3777
- ★ Executive bookcase, 30"Hx42"W, 2 shelves, hardwood, mahogany, \$100. 256-881-7153
- ★ Craftsman 10" table saw, 27"x30" table w/fence and guide, \$95. 880-6146
- ★ Sony Mavica FD-83 digital camera, takes floppy disks, approx. 2 yrs. old, \$300. 256-653-5731
- ★ Two Alan Jackson tickets, HSV, Nov. 7, \$50 each. 837-1774
- ★ Hitachi 50" big screen TV, all manuals and remote included, \$550. 961-7713
- ★ Antique armoire and matching vanity, oak, unique carvings, very old, \$500 per piece. 479-1527
- ★ 1977 Avion travel trailer, 27', for hunting, camping or lake lot, \$4,900. 931-427-2059
- ★ Two Valhalla crypts, eye level, side-by-side, Masonic Bldg., all fees included, \$5,800. 860-657-1618
- ★ Golden Retriever puppies, AKC, parents on-site, \$185 each. 256-233-0025
- ★ Finishing mower, Woods RD7200, 3-pt. hitch, rear discharge, bought in May, \$1,500. 828-6325

- ★ Two Fram PH3593A oil filters, new in box, compatible with Honda Accord. 895-6640
- ★ Dell Mini-Tower 200MHz w/video, sound, Ethernet, modem, WindowsME/Office, \$50; Gateway 17" monitor, \$50. 765-532-4218
- ★ Matching sofa and chair, hunter green, burgundy, navy blue colors, \$150. 777-0419
- ★ Solid Cherry queen bed w/matching nightstand, \$300; changing table w/four drawers, \$50. 256-864-2818
- ★ Floral couch, \$65; Voit folding rider exerciser, \$20. 881-2272
- ★ C-Farmall tractor w/cultivator, reasonably priced. 837-5292
- ★ American Bulldog pups, 5 girls, 3 boys, ready for Christmas, \$200. 205-559-3700
- ★ Firm Exercise System, 12 tapes, sculpting stick, steps, weights, 3-15, ankle weights, \$100. 881-6016
- ★ Flex CTS weight bench, uses 10-200 lb. equivalent weight bands w/stepper, \$75. 464-9910
- ★ Infant car seat, \$20. 256-723-4983
- ★ Craftsman 14.5HP, 42" cut, new battery, \$450 firm. 729-1983
- ★ Palm V accessories kit, Modem, charger, Wireless Web, GSM upgrade, carrying cases, \$20. 772-8489
- ★ Handicap "Medline" bedside commode, never used, \$75; Bisselle Smartmix power steamer carpet cleaner, \$75. 828-2178
- ★ Men's Huffly bike, 26", 10-speed, \$35. 881-9325
- ★ Used washer/dryer; new portable roll-around combination grill/ice chest, "Grill2Go-Fire-'N'-Ice. 233-0705
- ★ Nokia cell phone, Model 5160, used w/AT&T - open to other providers, \$12.50. 683-7683
- ★ Ping Tisi 8.5 degree driver, Tour Stiff Grafalloy shaft, \$130. 656-8544
- ★ Rickenbacker bass guitar with hard case. 306-0700 Decatur

Vehicles

- ★ 2000 Mazda 626, 4-door, 41K miles, silver w/gray interior, PS/PB/PB/PL, AM/FM/CD cassette, a/c, \$9,950. 256-230-0806
- ★ 1995 Dodge Caravan SE, automatic, power windows/door locks, 165K miles, 3.3L/V6. 880-3337
- ★ 2001 Acura 3.2TL, 47K miles, 225HP, gray w/gray leather interior, \$19,500. 256-325-9325
- ★ 1988 Nissan Pathfinder SE30, manual, PW/PDL, a/c, CD, 218K miles, \$3,500. 881-0656 after 5 p.m.
- ★ 1991 Nissan 300ZX, 128K miles, automatic transmission, T-tops, CD, charcoal gray, \$5,900. 882-2654

- ★ 1991 Oldsmobile Cutlass Ciera, 4-door, auto, air, 3.31/V6, 95K miles, needs paint, \$1,050. 882-1576
- ★ 1992 Honda Accord, 2-door, LX, \$800. 513-0524
- ★ 1992 Firebird 305, automatic, green, T-tops, factory CD, 183K miles, one-owner, well maintained, \$4,000. 931-433-8542
- ★ 1988 Crown Victoria, blue, recently painted, new a/c, new tires, service records available, \$1,700. 679-3056
- ★ 1986 Corvette, red on red, 4+3 manual transmission, Z51, 86K miles, \$8,800. 881-8446
- ★ 1995 Mazda Protégé LX, one-owner, 115K miles, automatic, PS/PB/PW/PL, a/c, cruise, moonroof, green, \$2,500. 829-0285
- ★ 1997 Ford Explorer XLT, maroon, leather interior, PD/PL, new tires & shocks, one-owner, \$7,000. 721-7799
- ★ 1999 Toyota Avalon XL, all-power, leather, moonroof, champagne, 76K miles, \$10,800. 880-9025

Wanted

- ★ Treadmill in good condition. 325-0554
- ★ One long piece flexible track for matchbox cars. 881-5897
- ★ Good quality desk/office chair. 883-2757
- ★ Old door, 32" wide, 4-panel style, have 34" door as possible swap. 534-4968
- ★ Full-size bed, \$100-\$125 price range. 656-7349
- ★ Small tiller, working or not working. 883-2757
- ★ Used dirt bike, 100-125, must be completely mechanically sound. 828-5246
- ★ Someone to cut/haul 10 to 20 trees to sawmill, ideal work for mule/horse team. 256-890-0401

Free

- ★ To good adult home, mature cat, quiet, declawed, neutered. 462-1518
- ★ Old issues (some in the sixties) of the Marshall Star. 881-0373

Found

- ★ Pair of reading glasses in Bldg. 4487, 2nd floor, C-wing. 544-9101

Lost

- ★ Gold tie chain, near Bldg. 4202 parking lot or West sidewalk. 544-8903

MARSHALL STAR

Vol. 44/No. 8

Marshall Space Flight Center, Alabama 35812
(256) 544-0030
<http://www1.msfc.nasa.gov>

The Marshall Star is published every Thursday by the Internal Relations and Communications Department at the George C. Marshall Space Flight Center, National Aeronautics and Space Administration. Contributions should be submitted no later than Monday noon to the Marshall Internal Relations and Communications Department (CD40), Bldg. 4200, room 101. Submissions should be written legibly and include the originator's name. Send electronic mail submissions to: intercom@msfc.nasa.gov The Marshall Star does not publish commercial advertising of any kind.

Manager of Internal Relations
and Communications — Steven Durham
Editor — Jonathan Baggs

U.S. Government Printing Office 2002-633-065-60078

Permit No. G-27
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